



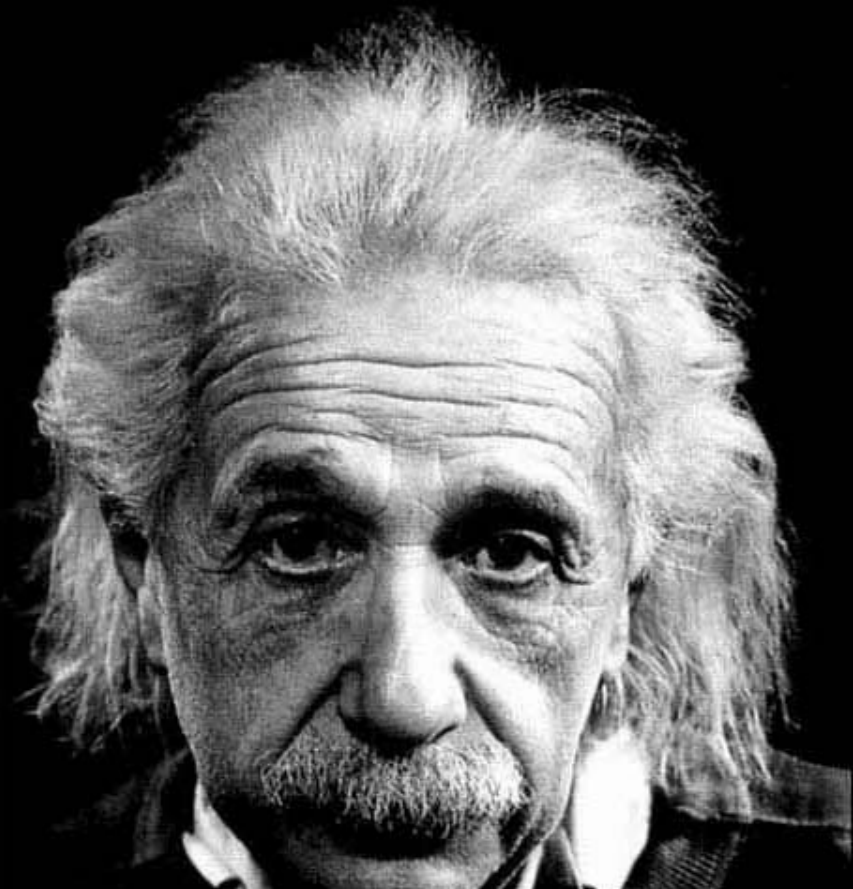
Makkelijker kunnen we het niet maken Wel leuker

Afscheidscollege Chris van Weert

25 april 2007

“Everything should be made
as simple as possible,
but not simpler.”

Albert Einstein



Natuurkunde of Wiskunde?



Energie



Stroomverbruik



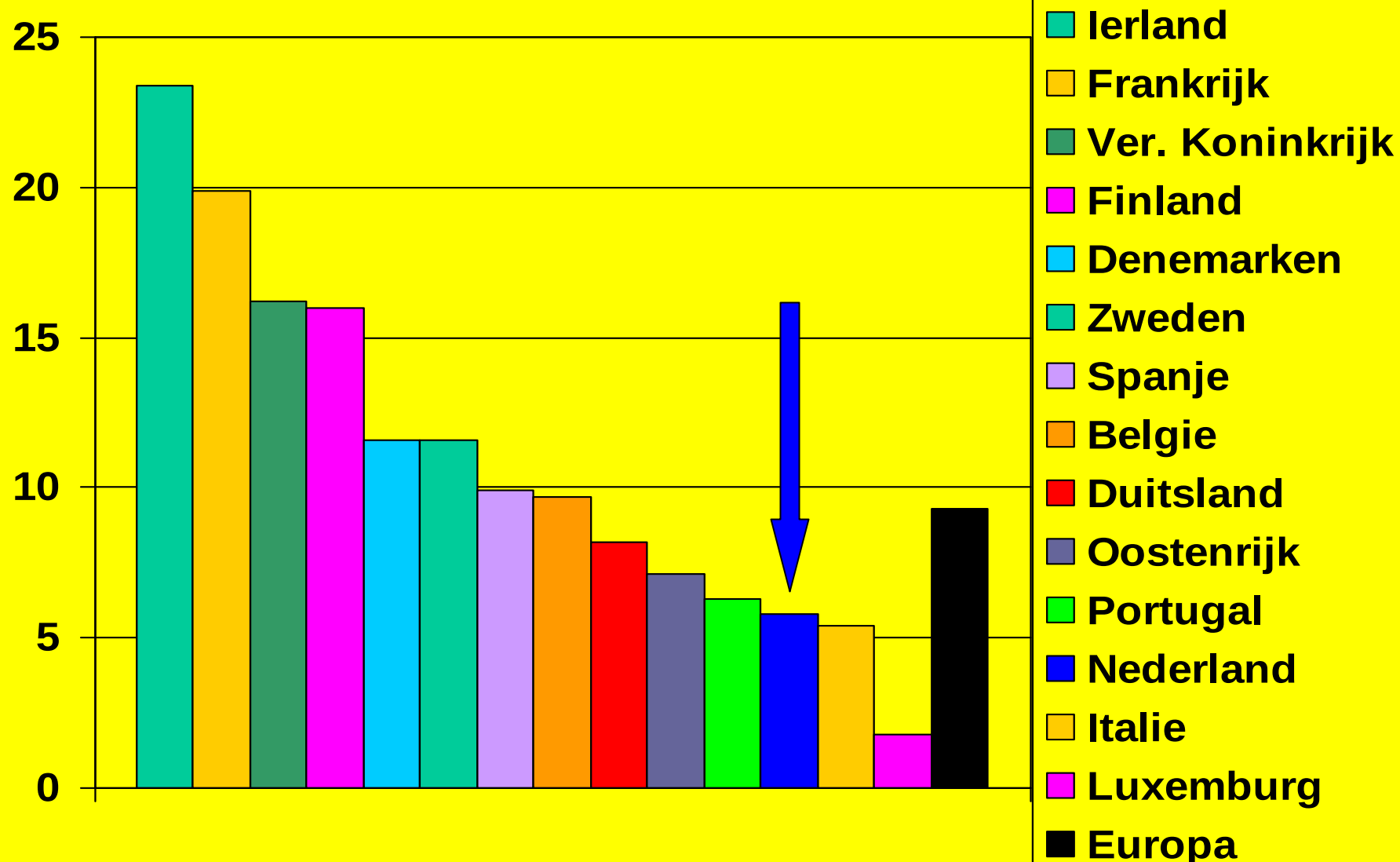
Profielkeuze eindexamenkandidaten HAVO 2005

Profiel	Jongens %	Meisjes %
Natuur en Techniek	18	1,4
Natuur en Gezondheid	17	17
Economie en Maatschappij	48	27
Cultuur en Maatschappij	13	53

Profielkeuze eindexamenkandidaten VWO 2005

Profiel	Jongens %	Meisjes %
Natuur en Techniek	25	3,5
Natuur en Gezondheid	24	35
Economie en Maatschappij	37	27
Cultuur en Maatschappij	7	31

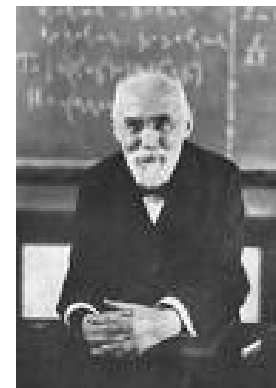
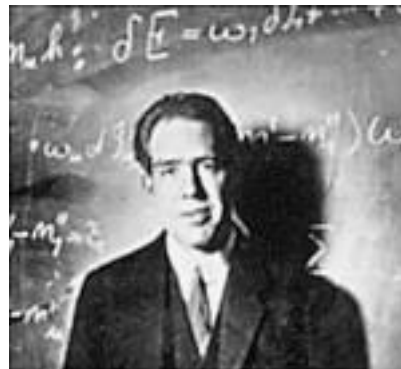
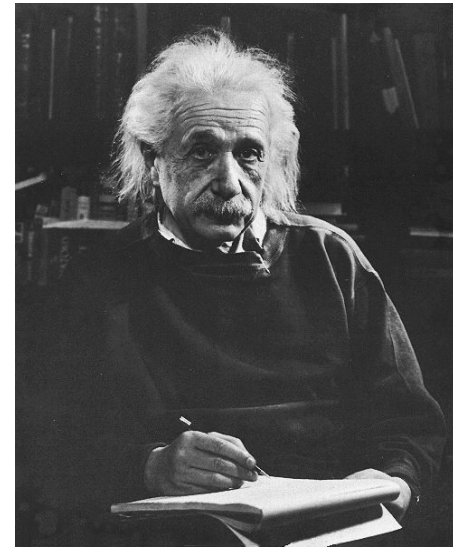
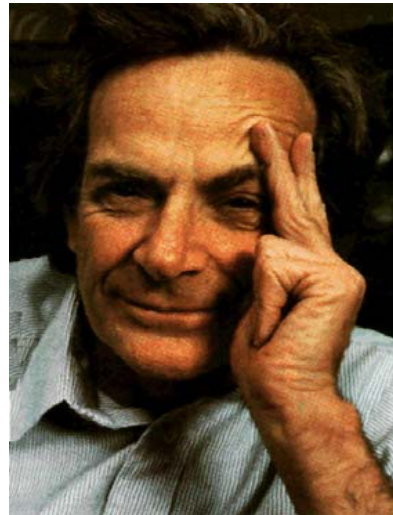
Afgestudeerden en promovendi onder 20-29 jarigen in wiskunde, natuurkunde, en techniek (2000)



Coming soon:
ITS-Akademie



Famous

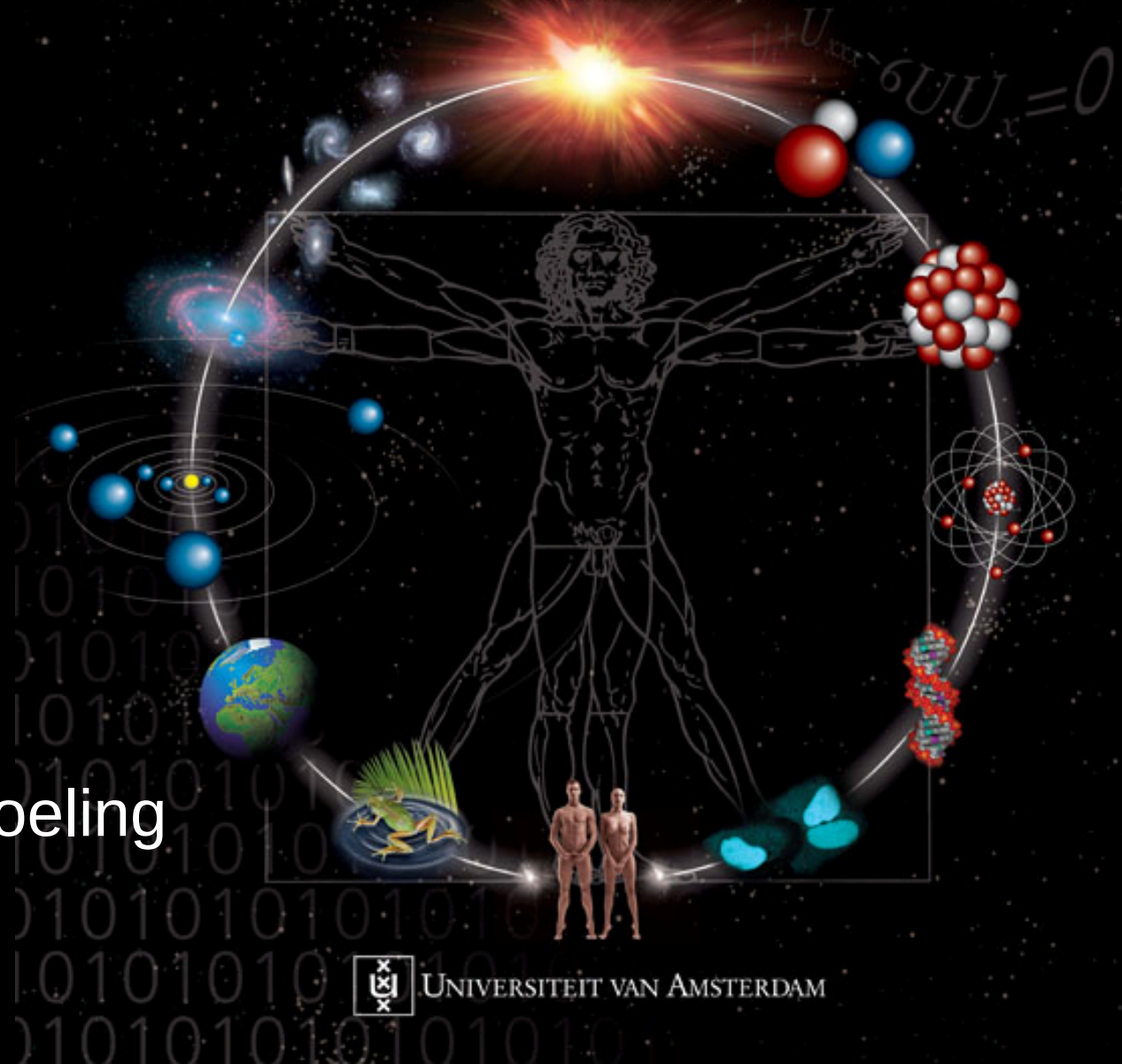




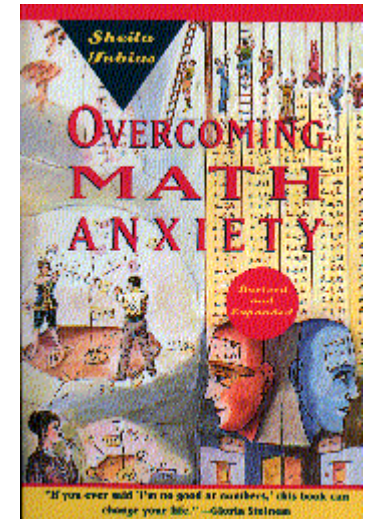
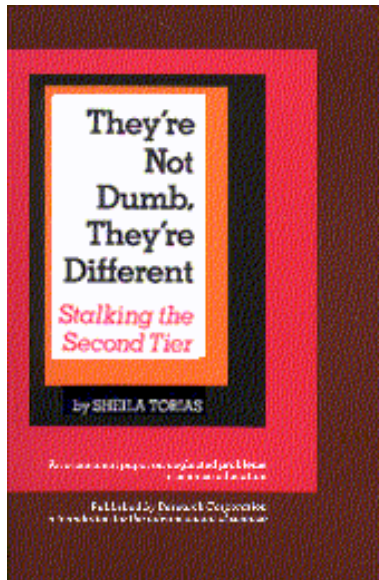
"Kwantummechanica is
net als cricket: volkomen
onbegrijpelijk"



Wat is de bedoeling
van dit alles?



Sheila Tobias



“They're not Dumb, They're Different”

Eric Mazur

Harvard University



“Nothing clarifies ideas better than explaining them to others”



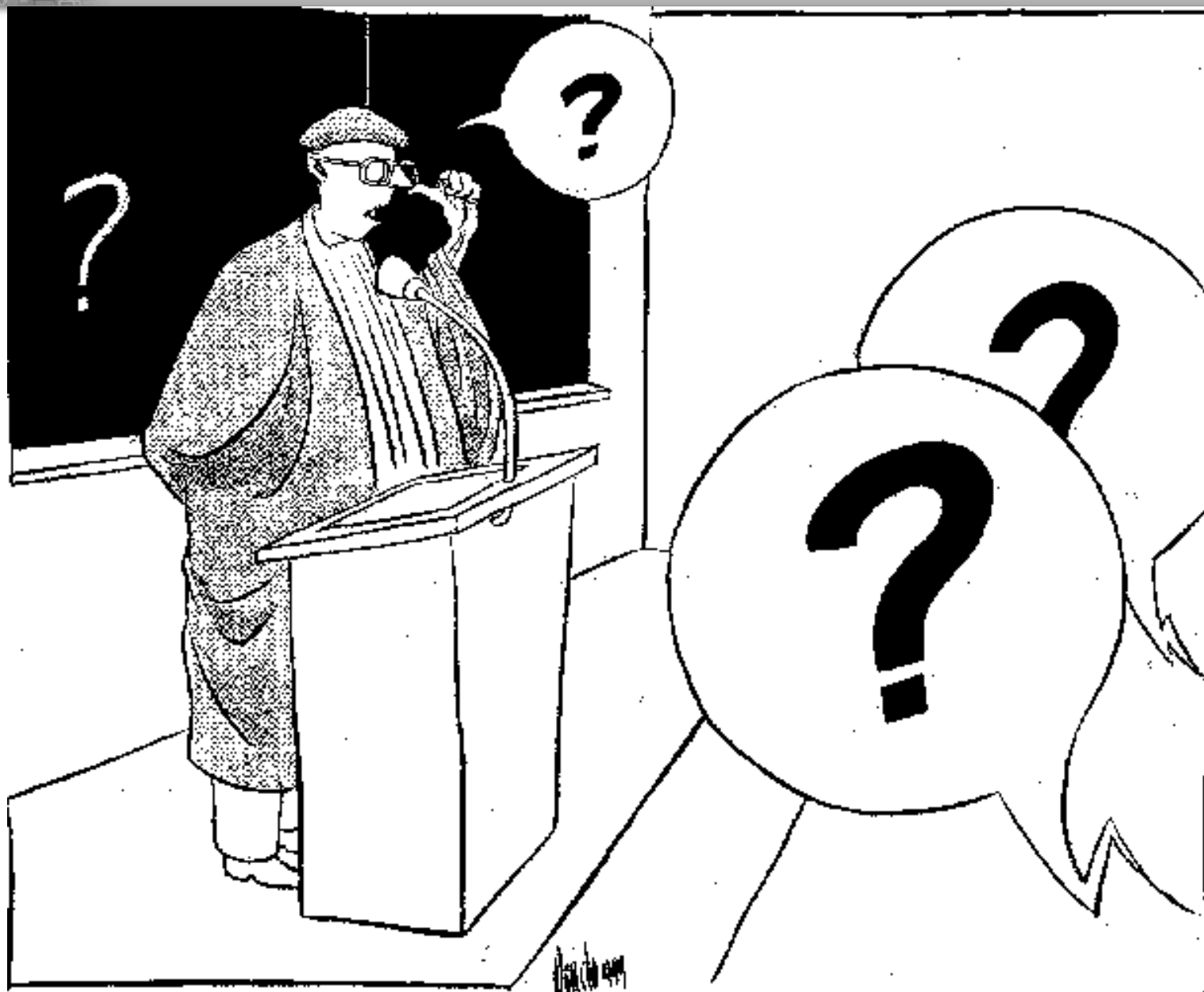
Peer Instruction actively engages the students in their own learning.

This gives students the opportunity to discover and correct their misunderstandings, and, in the process, learn the key ideas of physics from one another.

Leerpiramide van Bales



National Training Laboratories, Bethel, Maine, USA



Studio Classroom

- (20 min) Introductie

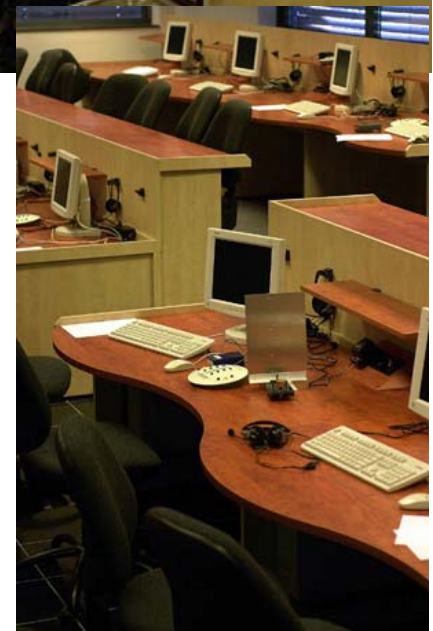
- (40 min) “Hands-on”
Groepsactiviteit

- (10 min) Discussie

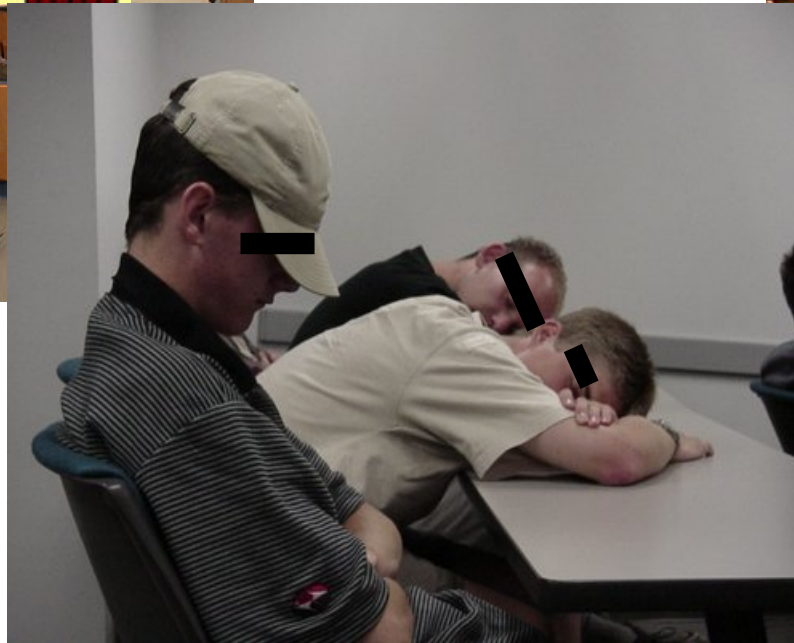
- (15 min) “Hands-on”
Groepsactiviteit

- (15 min) Mini college:Theorie

- (5 min) Conclusie



“Je begrijpt het pas als je het ziet”



Courtesy Marcel Vreeswijk



De Schoolmeester

Adriaen Van Ostade (1662)

Het 'Nieuwe' Leren



***“Zeg het me en ik zal het
vergeten***

***Toon het me en ik zal het
onthouden***

***Laat het me doen en ik zal het
leren”***

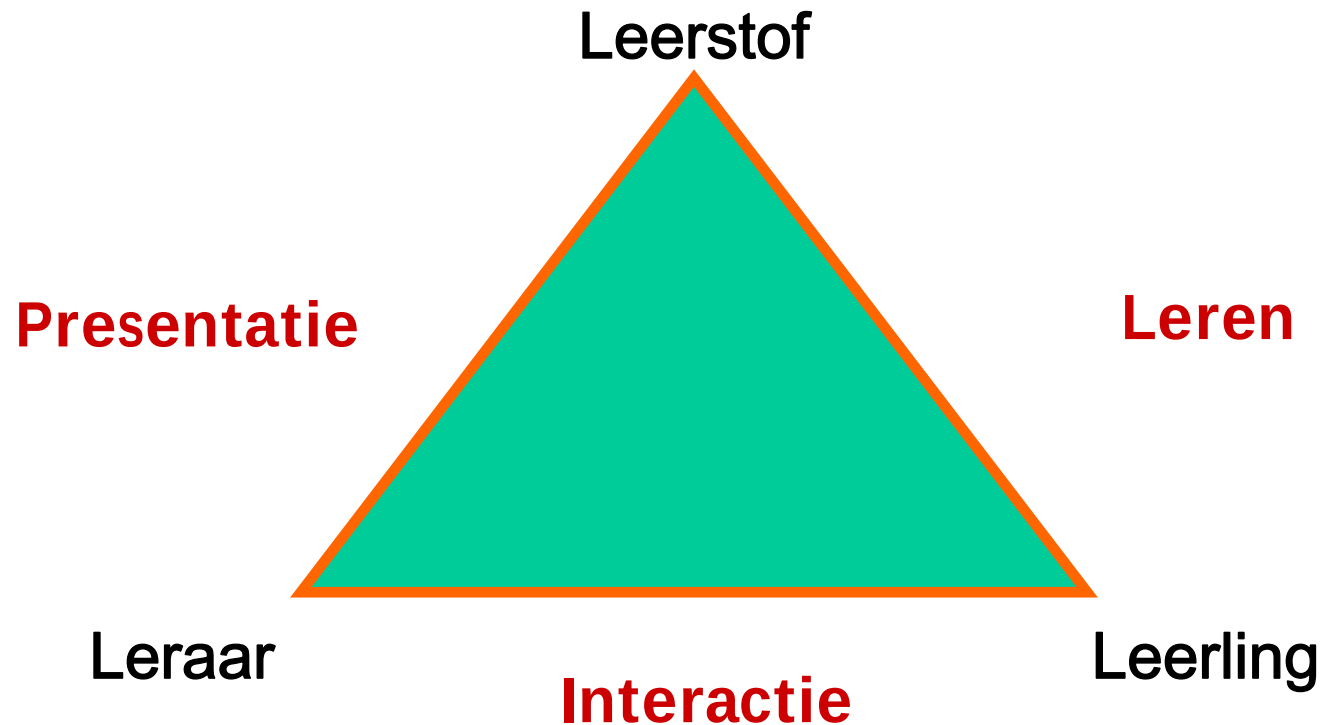
Confusius 500 v C

Welke leraar kiezen we vandaag?



Didactische Driehoek

'Didactica Magna' Jan Comenius 1657



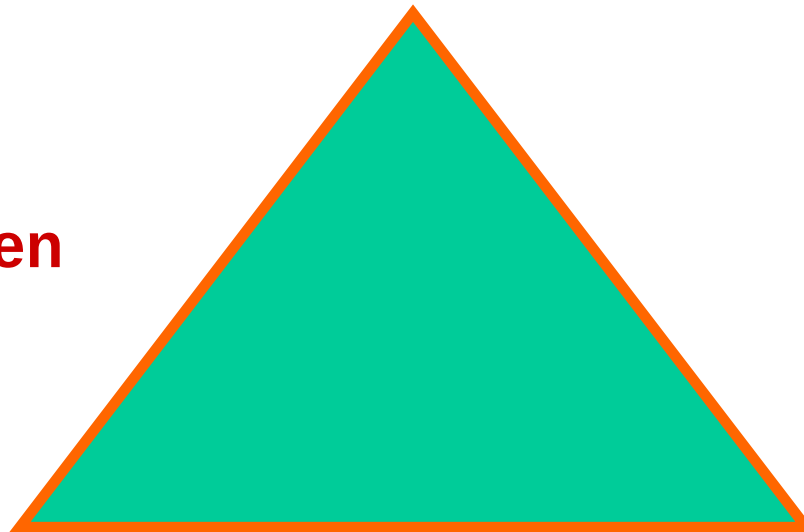
Het nieuwe leren

'de leerling wijst'

Leerling

Ontdekken

Vragen



Leeromgeving

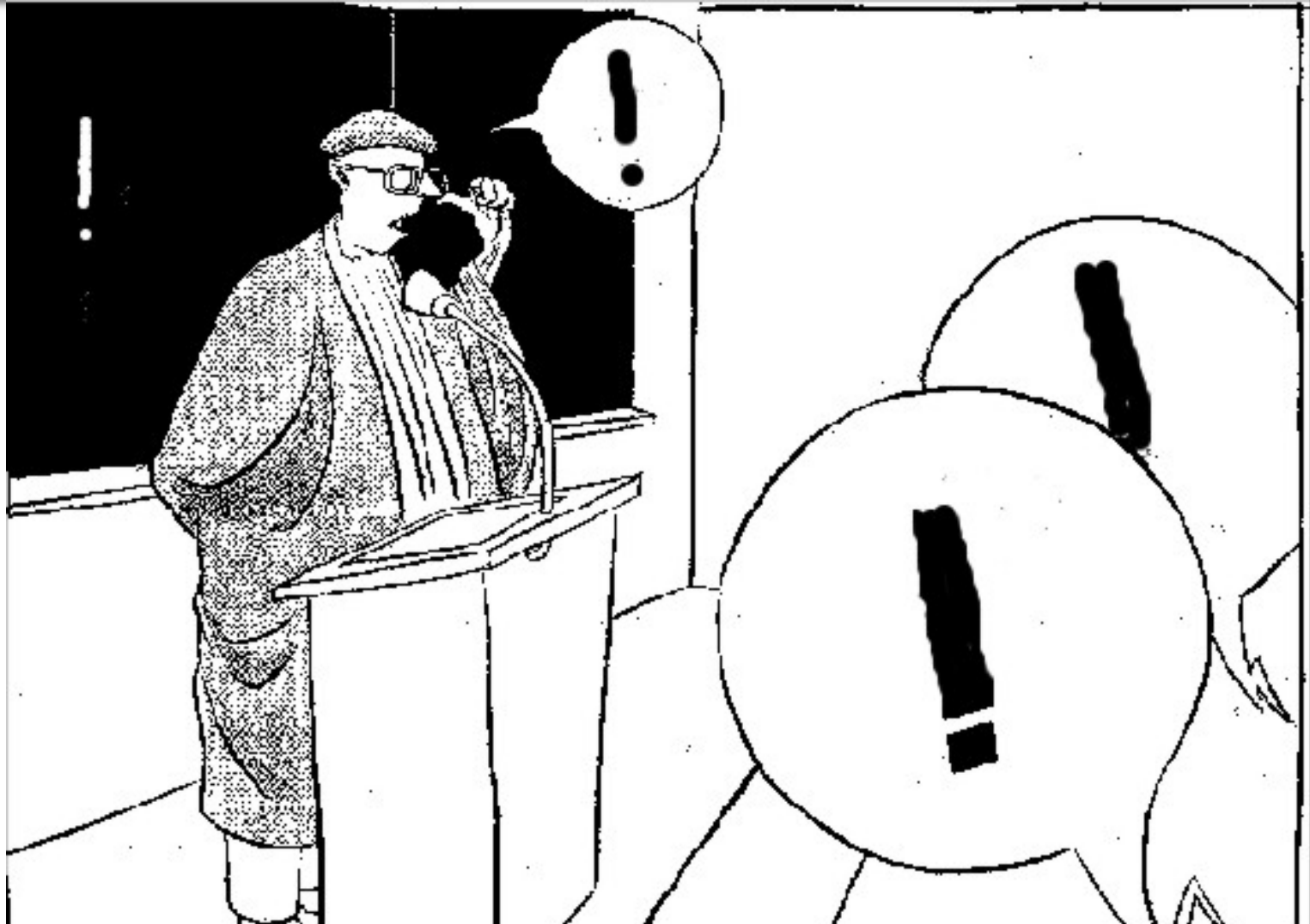
Betekenen

Leerbronnen



Constructivisme





Onderwijs = Communicatie

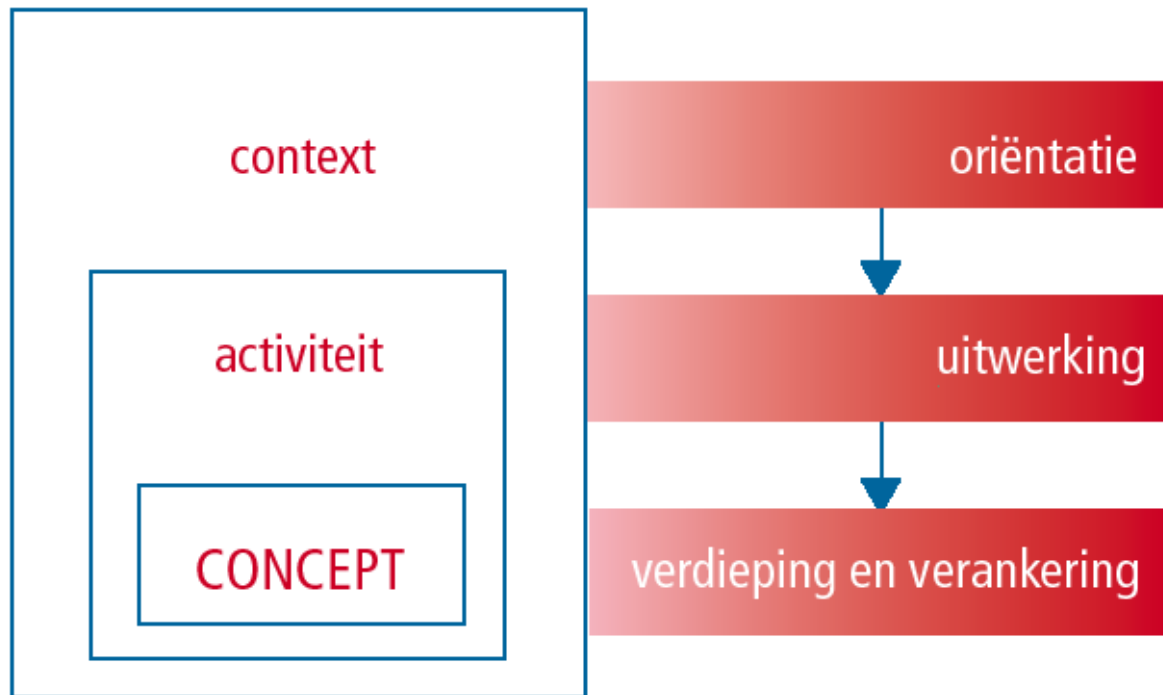
Commissie Vernieuwing Natuurkundeonderwijs Havo/Vwo

- Nieuw
Examenprogramma
2010
- context-en-
conceptbenadering
- vernieuwing in de
schoolpraktijk



Natuurkunde Leeft,
visiedocument (2006)

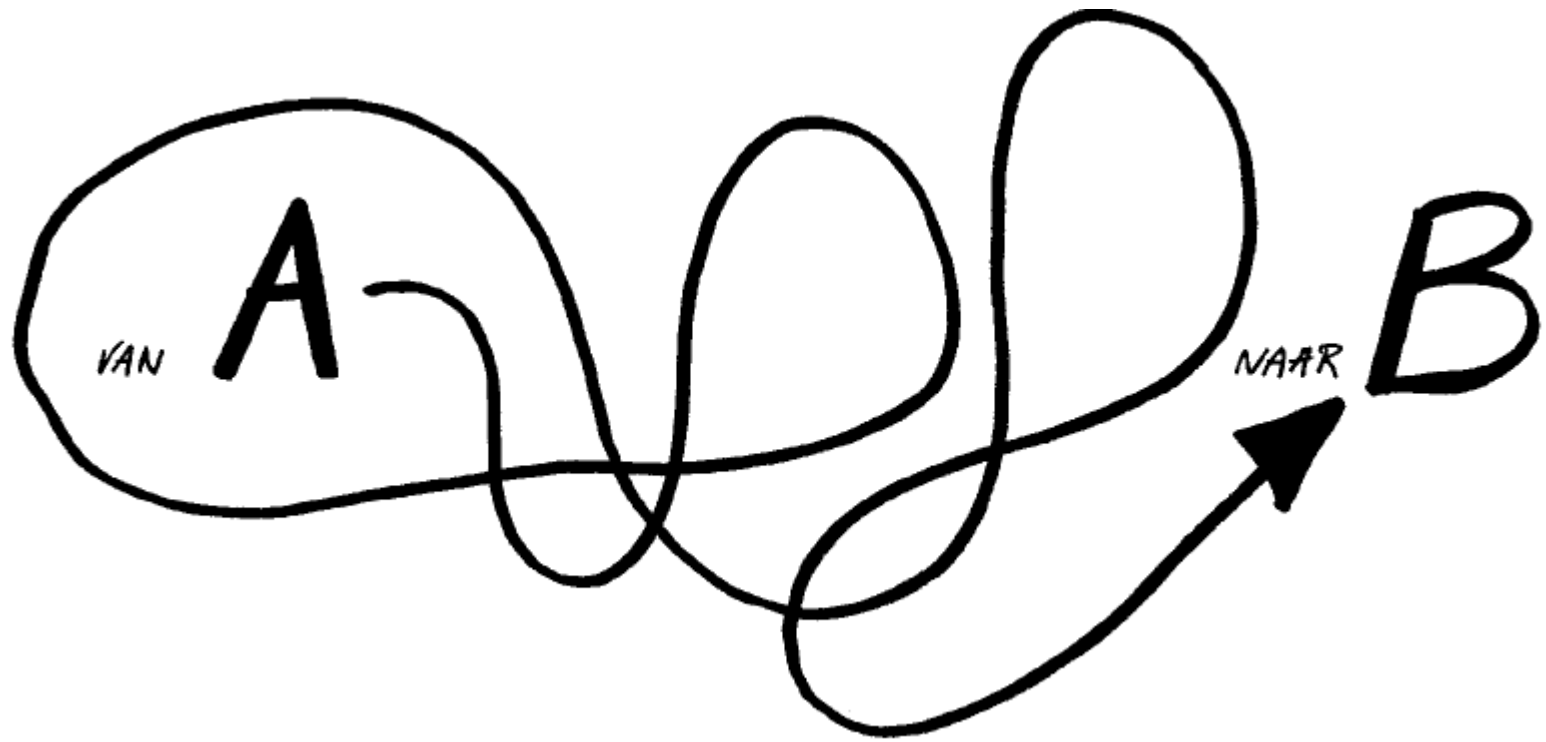
Context-Concept benadering



Onderwijs



Leren = het hanteren van de verwarring die onderwijs teweeg brengt



Robert Karplus 1927-1990

Theoretical Physicist turned Educator

“I believe that people become vitally interested in their studies and learn best when direction and guidance from a source of authority are combined with ample opportunities for students to direct and control their own learning”



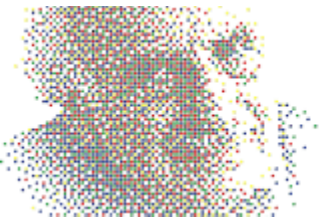
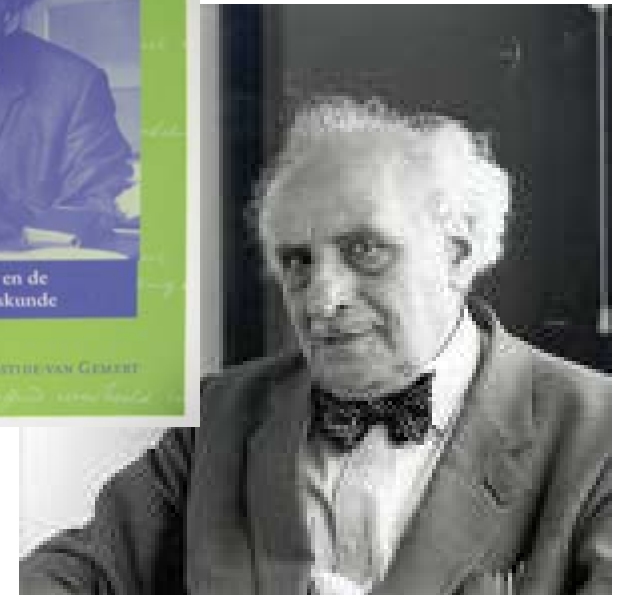
Oersted Medal 1980

‘Elke positieve actie begint met critiek’

Biografie van

Hans Freudenthal 1905-1990

Sacha La Bastide-van Gemert



Freudenthal Instituut

voor Didactiek van Wiskunde en Natuurwetenschappen
afdeling Wiskunde

Universiteit Utrecht



Carl Wieman

Science Education Program, University British Columbia

Nobel Prize Physics 2001_(with Cornell & Ketterle)

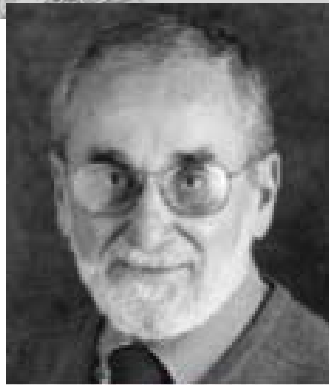
U.S. Professor Of The Year 2004

Chair of the Board on Science Education

Distinguished Professor and Presidential
Teaching Scholar awards

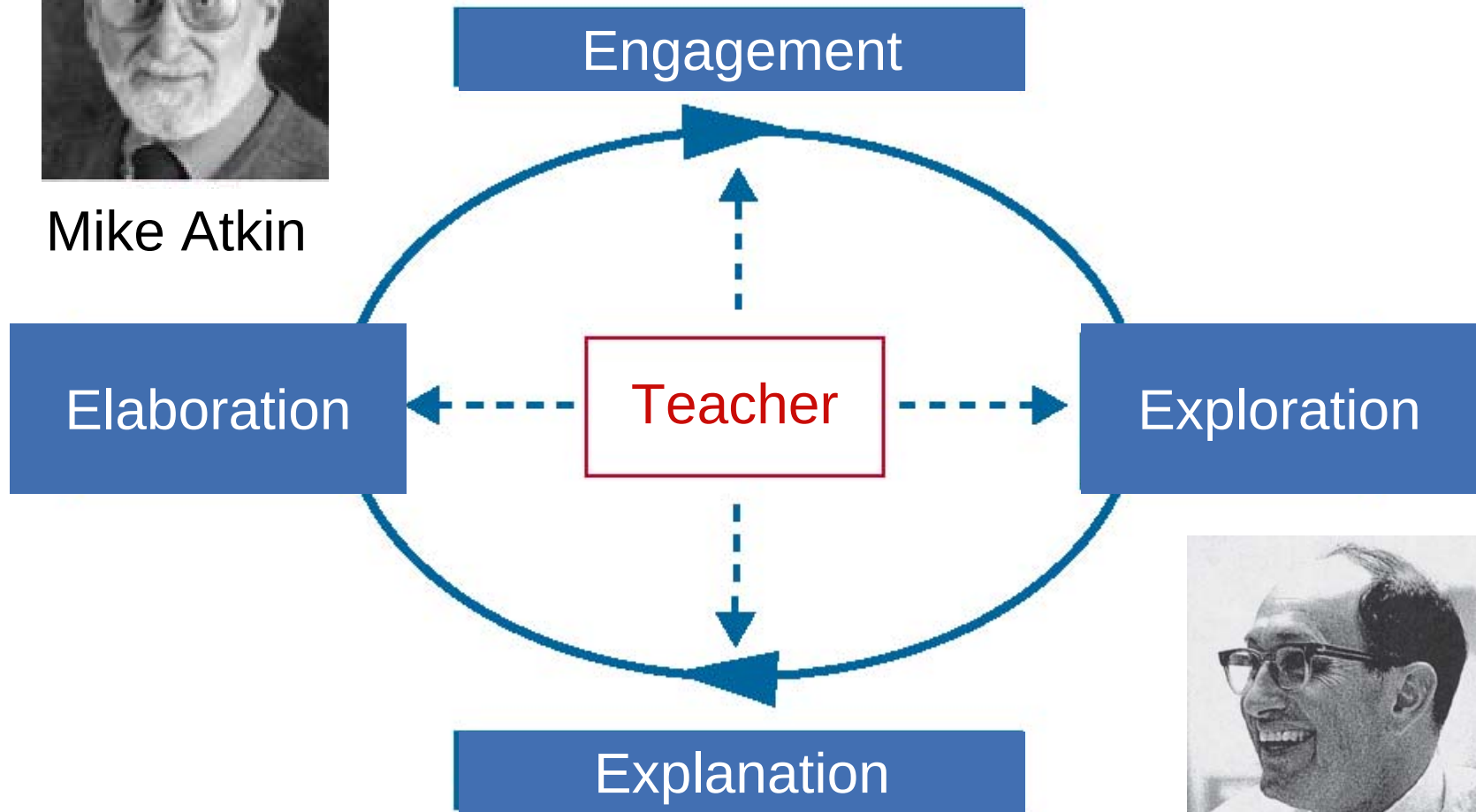


*“Changing the entire
education system may be
harder than creating the
Bose-Einstein condensate”*



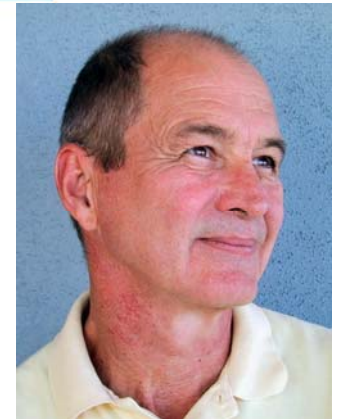
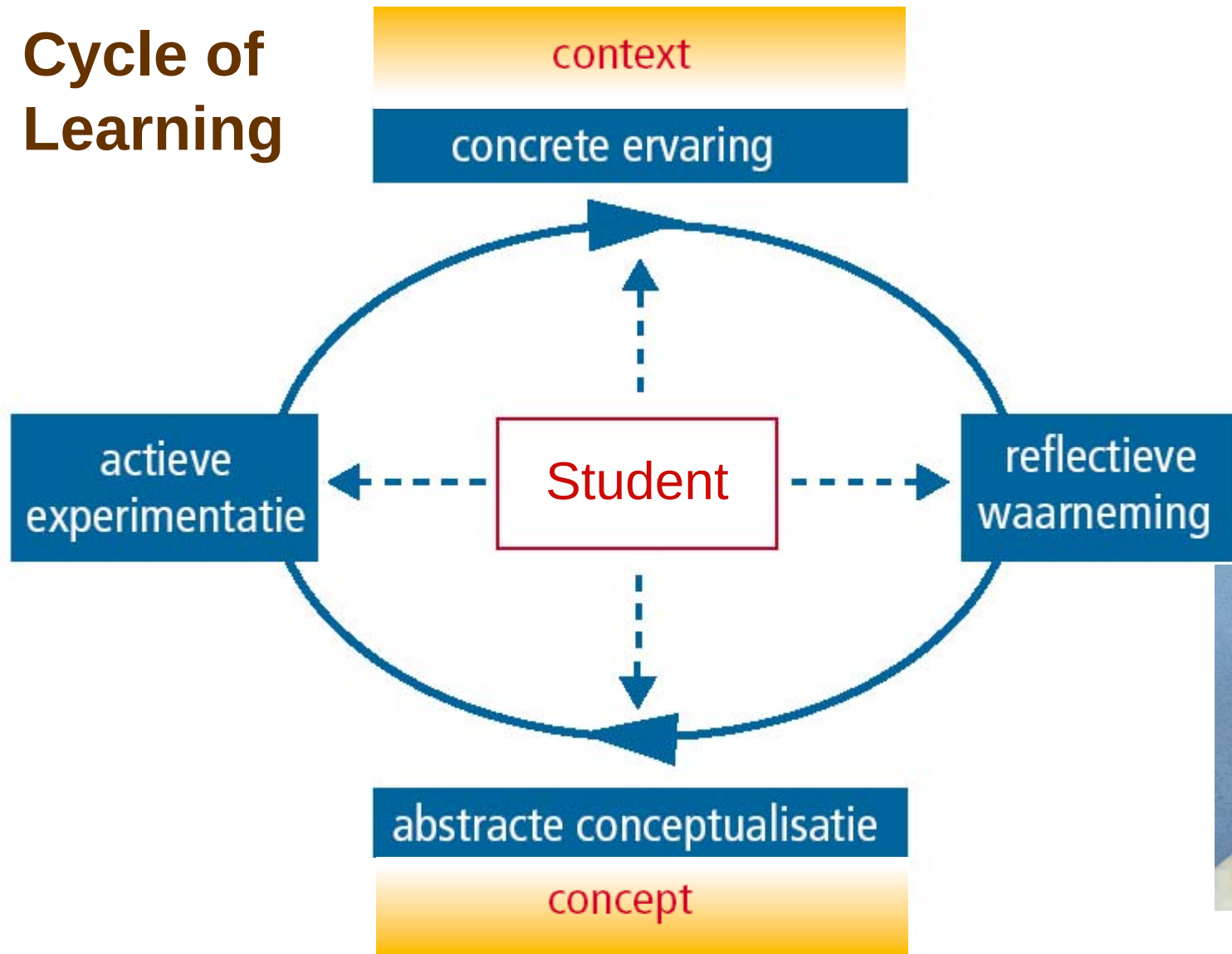
Mike Atkin

Learning Cycle Instruction



Robert Karplus

Cycle of Learning



David Kolb 1984

Ontwikkelingsstadia Piaget

Stadium	Leeftijd	Van Hiele niveau
Senso-motorisch	0-2	Concreet en visueel
Pre-operationele denken	2-6	Beschrijvend
Concreet operationele denken	7-11	Informeel deductief
Formeel operationele denken	12-16	Theoretisch deductief

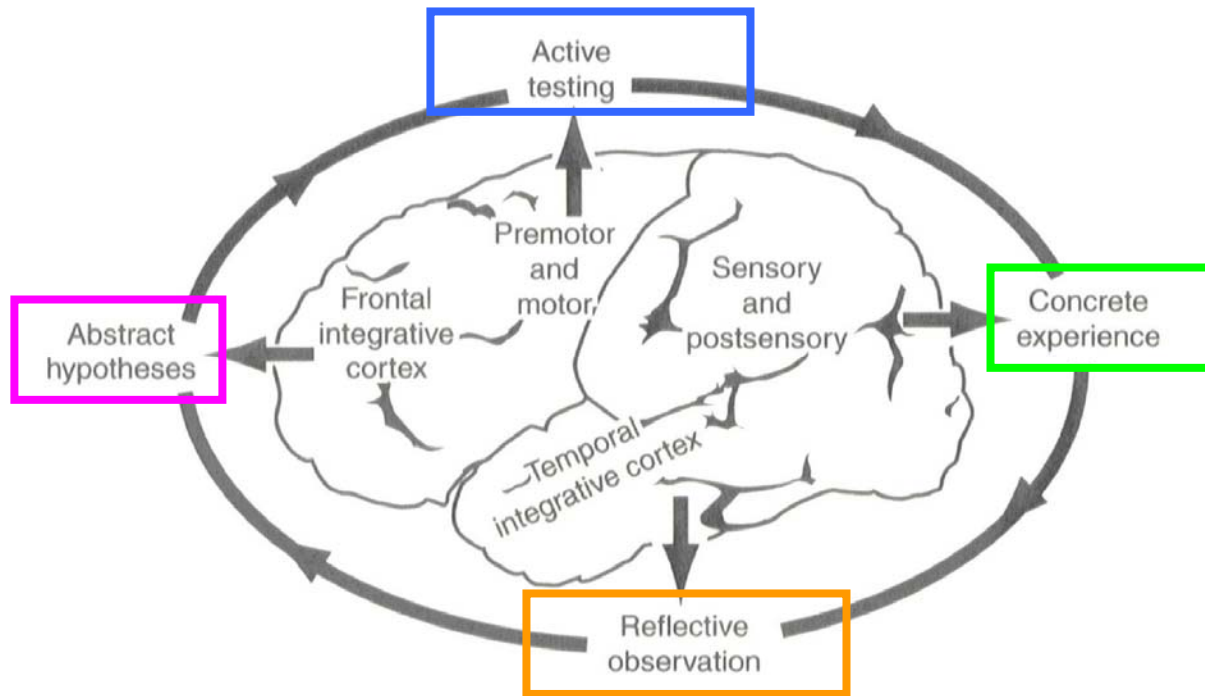


Jean Piaget



Pierre van Hiele

Leren van het brein



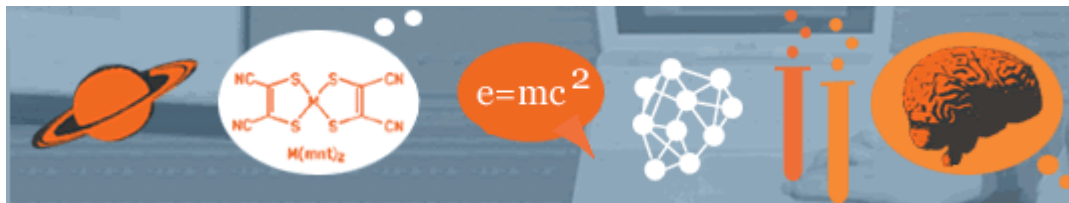
Jelle Jolles



WAKKER WORDEN Kinderlezingen



Leerlijn



Science literacy

Klas 1

klas 2

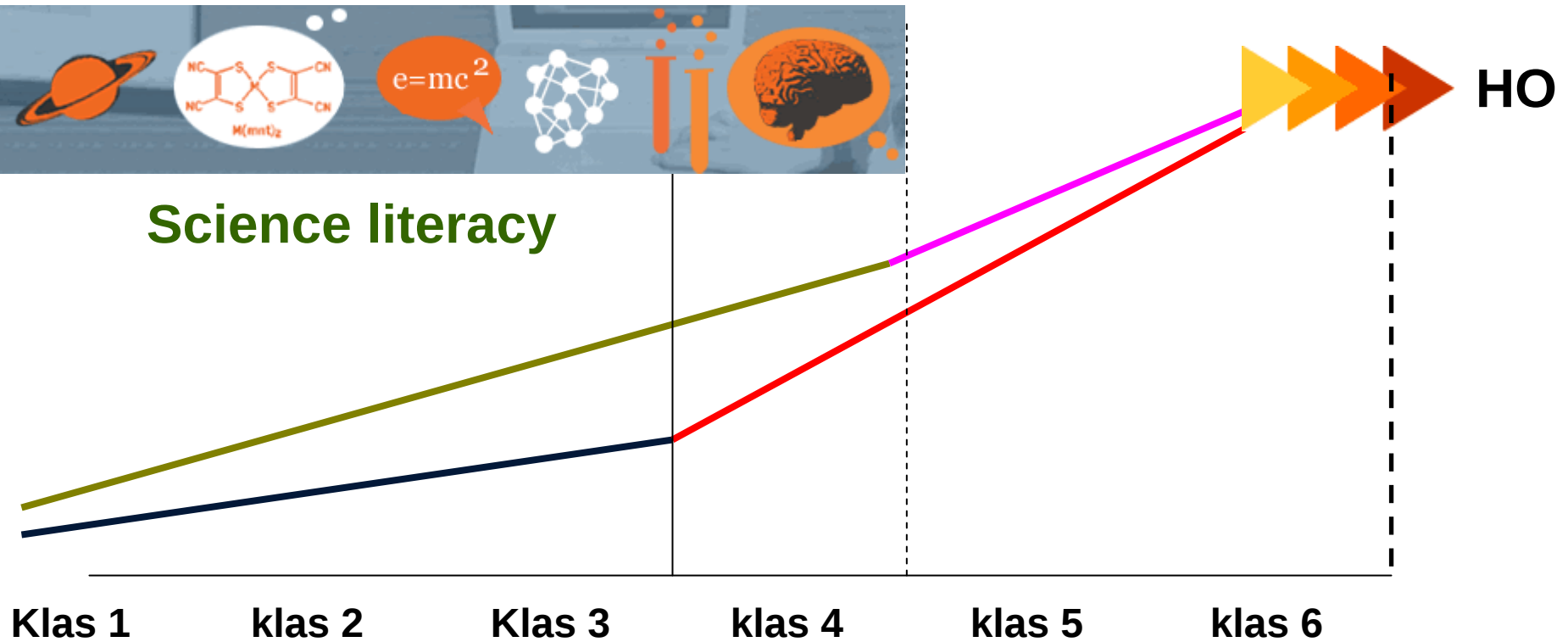
Klas 3

klas 4

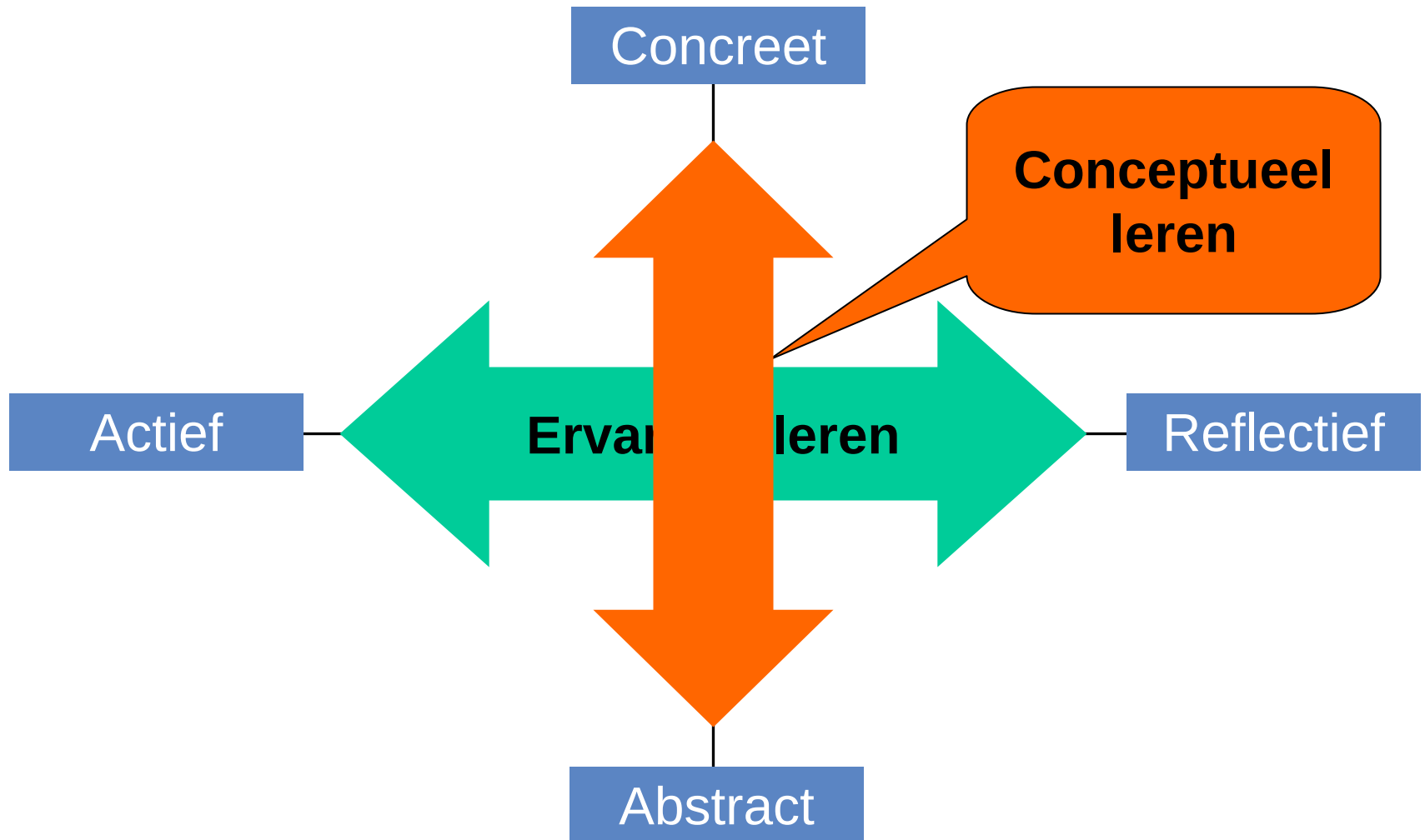
klas 5

klas 6

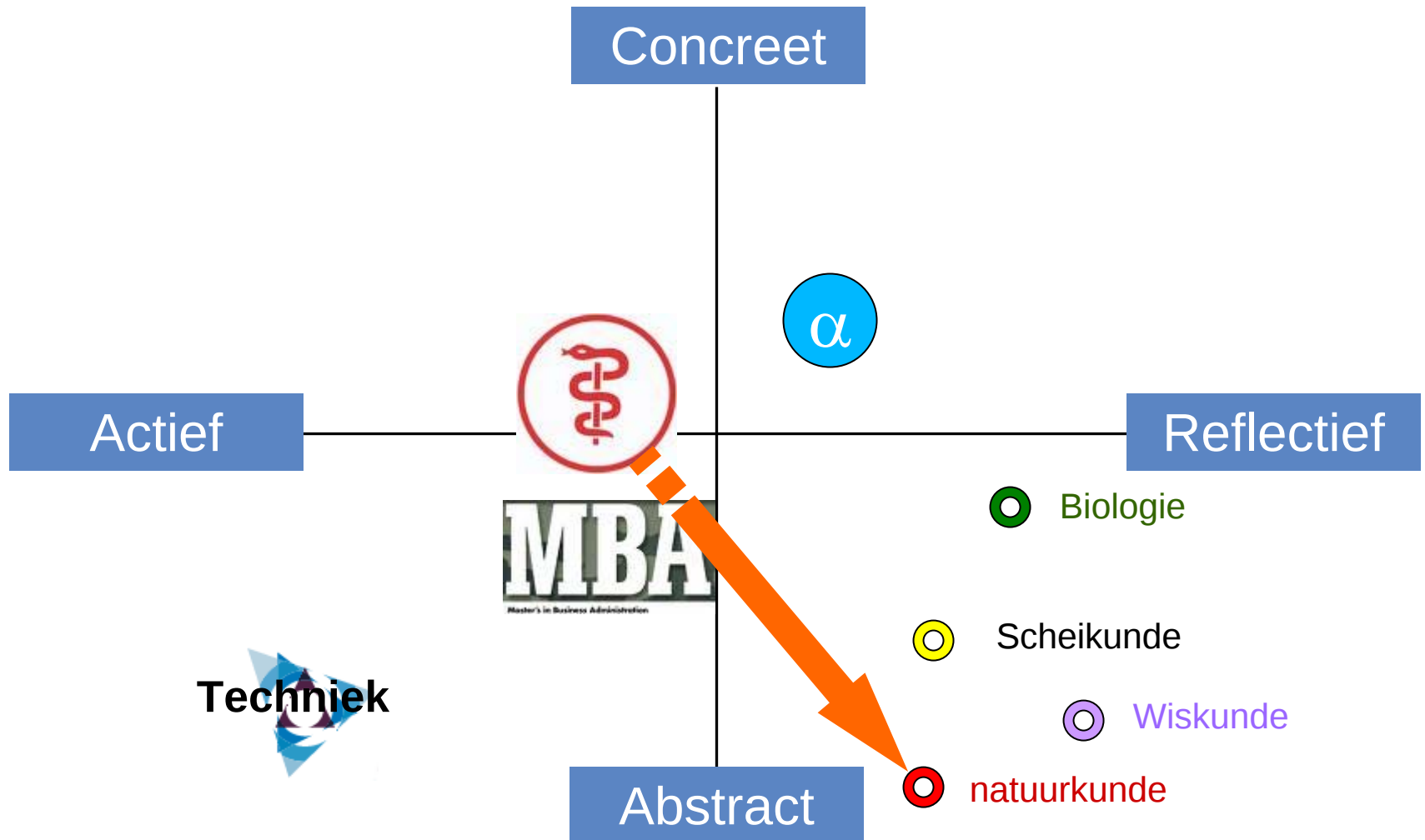
HO



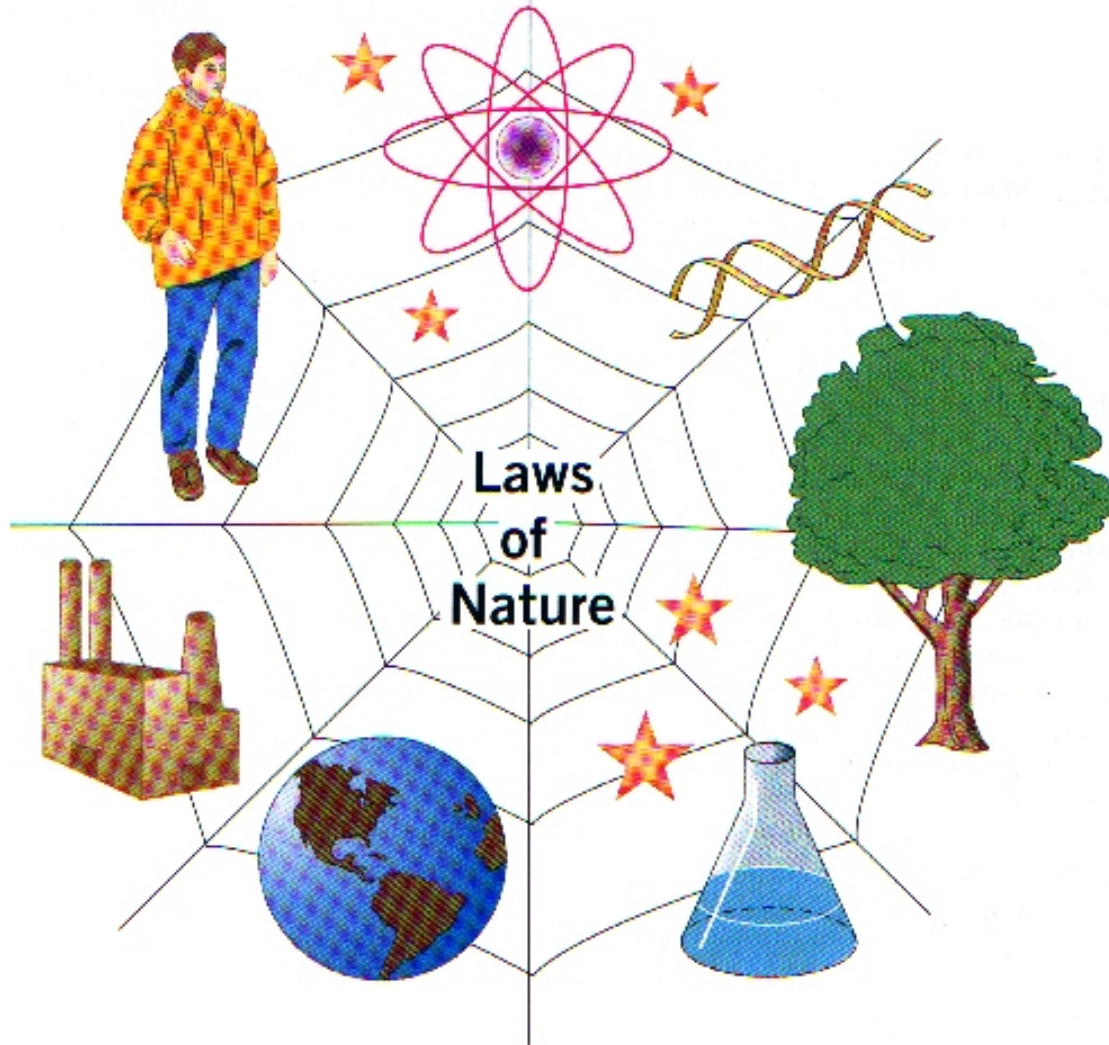
Leerstijlprofiel volgens Kolb



Leerstijlprofiel volgens Kolb

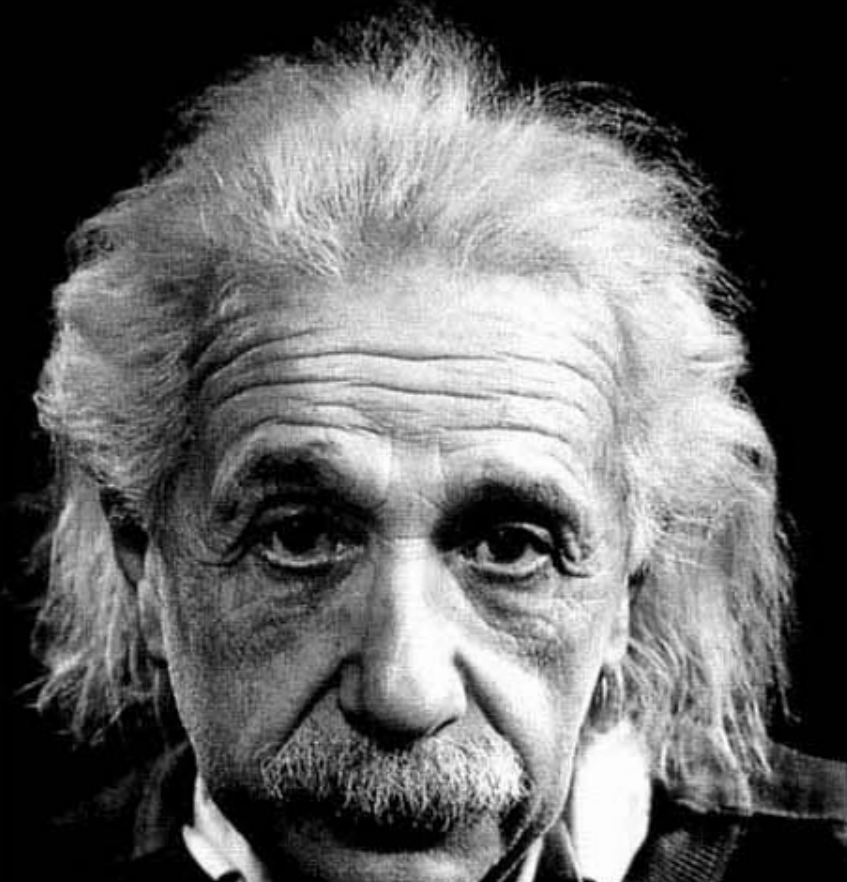


The context of physics is science

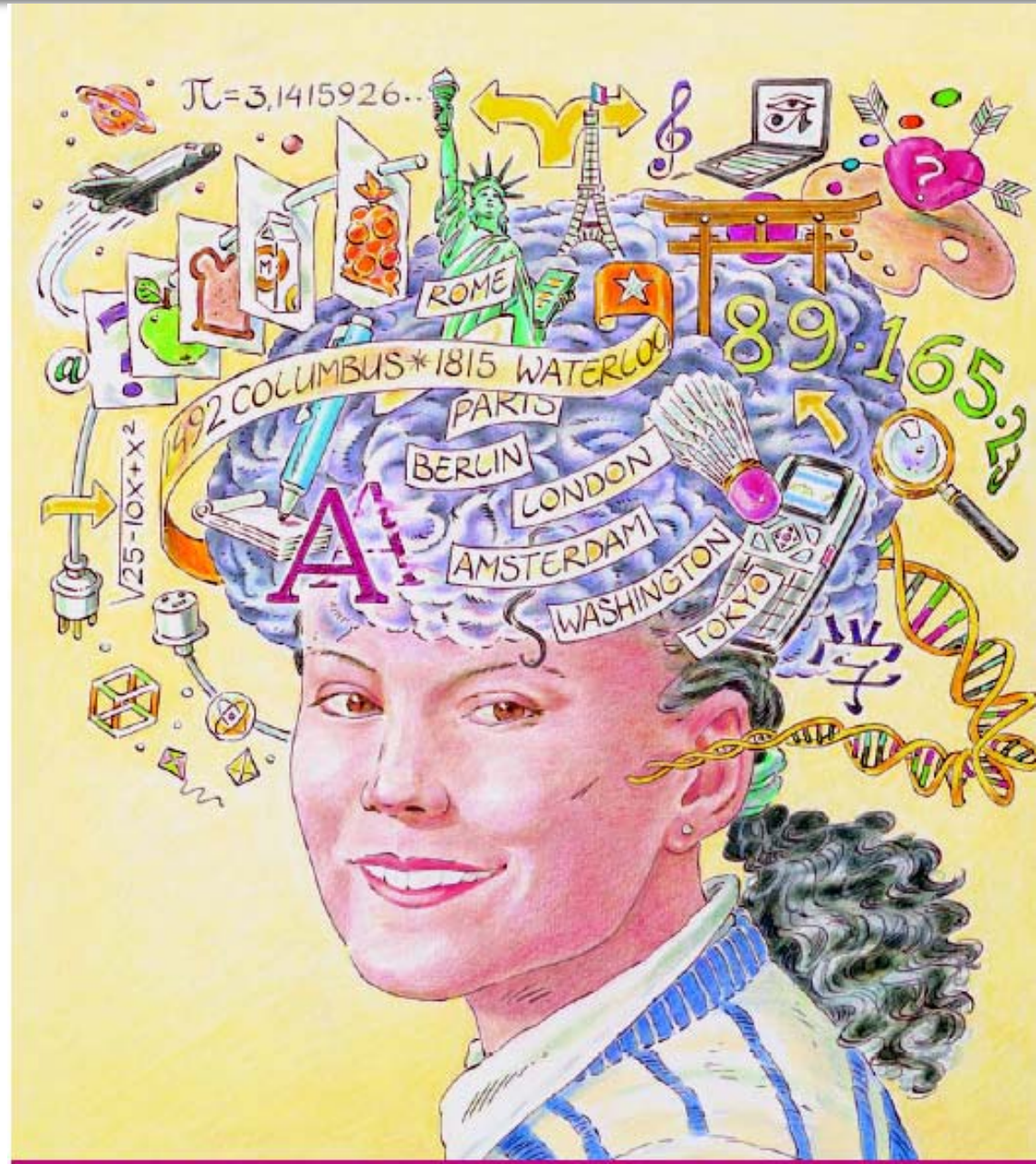


“Concepts are simply empty when they stop being firmly linked to experiences.

They resemble social climbers who are ashamed of their origins and want to deny them.”



Moderne jeugd



Een sociologisch gezichtspunt

“Schulen und Lehrer
sollen die begegnung
von fremden
Vorstellungswelten
ermöglichen.”



Thomas Ziehe

Professor für Pädagogik an der Universität Hannover

CLASSROOM

CLASSROOM



Brock Fitzgerald

Chrissy Zich

Loyal Minion
Shion Chandrayaan

NCI Alumnus
Heartz Breaker

Leto
Membe
Kianeira Mac

Officer
Zorb Losangeles

New Citizens Incorporated
Everyone Helping Ne

Second Life



De toekomst is al begonnen

Ik heb gezegd